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(54) Title of the Utility Model: ESCUTCHEON FIXATION STRUCTURE OF SMALL-SIZED ELECTRONIC DEVICE CASE

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SPECIFICATION

1. Title of the Utility Model ESCUTCHEON FIXING STRUCTURE OF SMALL-SIZED ELECTRONIC DEVICE CASE

2. Claims

(1) An escutcheon fixation stricture of a small-sized electronic device case comprising a plastic escutcheon (1), a chassis (14), and a cover for covering the chassis (14), in which the plastic escutcheon (1) is fixed to a chassis (14) by means of small screws, characterized in that a fixing portion (11) is formed so as to be integrated with the plastic escutcheon (1) and extend in the chassis (14) direction; the fixing portion (11) has a tightening hole (12) of which a part is notched; and barrier walls (16) and (17) having a function as a stopper are provided for a part of the chassis (14) corresponding to the fixing portion (11), the barrier walls having a shape and size corresponding to

that of the fixing portion (11).

(2) An escutcheon fixation structure of a small-sized electronic device case according to Claim 1, characterized in that barrier walls (19) and (20) having a function as a stopper are provided separately from the chassis (14').

(3) An escutcheon fixation structure of a small-sized electronic device case according to Claim 1 or 2, characterized in that a notch (35) of the escutcheon fixing portion (33) is arranged on the back side of the tightening hole (34), a concavity (39) is provided for a part of the fixing portion (32) which is on the front side of the tightening hole (34), and a barrier (37), (38) having a function as a stopper is formed in a shape and size corresponding to that of the fixing portion.

3. Detailed Description of the Device

(Field of Industrial Application)

This device relates to a structure for fixing a front-side escutcheon to a back-side chassis in a case of an small-sized electronic device which is mounted on a vehicle or the like.

(Prior Art)

Fig. 11 shows the appearance of a general case of a small-sized electronic device. Reference numeral 1 designates an escutcheon positioned in the front of the case

and is made of plastic. Reference numeral 2 designates a cover for covering a chassis positioned on the back side. Reference numeral 3 designates a screw for fixing a cover.

Fig. 12 is a partial cross-sectional view of the electronic device of Fig. 11 which is taken from the right side. Fig. 13 is a partial cross-sectional view of the electronic device of Fig. 11 which is taken from the upper side. In the escutcheon 1, a unit is placed, in which an operation button and an operation switch for operating the electronic device, LED and LEC for display, and so forth are integrated with each other.

Referring to Figs. 12 and 13, reference numeral 4 designates a chassis. Ordinarily, a print substrate having an electronic circuit placed therein, and so forth are put into the chassis, and is positioned on the back side of the escutcheon 1. Reference numeral 5 designates a cover fixing tap hole. Reference numeral 6 designates a depression for a cover fixing screw, which is formed on the cover. The depression is formed by press-forming. Moreover, in the drawings, a fixing portion 7 in which the plastic escutcheon is integrated with the chassis 4 extending backward, and a flat head Phillips screw 8 for fixing the chassis 4 to the escutcheon 1 are shown.

The above-described structure is necessary, since the L size in Fig. 11 is desired to be as small as possible. Thus,

the l size in Fig. 13 can be reduced to be very small, i.e., about 1.5 mm.

Fig. 14 shows the details of the escutcheon fixing portion 7. Reference numeral 9 designates a counter sink. Fig. 15 shows the cross-sectional view of the countersink. Referring to the periphery to the hole 9 of the plastic product, at plastic forming, the flow of a plastic material is divided so as to sandwich the hole 9, and, then, merge with each other on the downstream side of the hole. That is, the plastic material flows around a metallic mold having a convex shape, which corresponds to the shape of the hole 9. The divided plastic materials merge with each other on the downstream side of the metallic mold. Visible lines are formed in the material-merging portion of the plastic product. These lines are called weld lines or weld marks. The weld lines or weld marks are formed, since the temperature of the plastic material is reduced when the divided materials merge with each other, so that the materials can not completely be united with each other in the molten state. The weld lines are formed far from the gate of the mold. Generally, the weld line portion of a molding product is brittle and can be easily broken as compared with the other portions of the product. In Fig. 14, a weld line is designate by reference numeral 10. In the above-described structure, the escutcheon 1 is fixed to the

chassis 4 by means of a flat-head Phillips screw, and further, the screw 8 is more tightened. Then, the inclined plane of the screw 8 comes into contact with the inclined surface of the countersink 9. Moreover, a force is applied so as to expand the countersink 9. The force received by the countersink 9 concentrates on the weld line 10, and thus, cracks are formed. To prevent the formation of cracks, the tightening torque of the screw is regulated. However, cracks may generate long time after the tightening.

Fig. 16 is a partial cross-sectional view of another example of an escutcheon fixation structure which is taken from the upper side thereof. In this case, a pan-head small screw 8' is used to fix the fixing portion 7 integrated with the escutcheon 1 and extending backward, to the chassis 4. The fixing portion 7 extending backward from the escutcheon 1 is positioned on the further inner side in the width direction of the case, as compared with the above-described conventional example. That is, it is required to set the distance between the fixing portion 7 and the cover 2 at l_1. Correspondingly, the space within the chassis 4 in which an electronic part is to be put becomes smaller. On other words, it is required to set the width at the space for accepting the electronic part plus $2l_1$. In the case of the small-sized electronic device which is an object of the present device, it is necessary to increase the size of the

case, e.g., by 3 mm to 10 mm. Referring to Fig. 16, there are some cases in which a rising portion 7' for strengthening the fixing portion 7 is provided. Considering the size l_2 of the rising portion 7' in addition to the height of the head of the pan-head small screw 8', the size l_1 will be about 10 mm. Moreover, dangerously, it is possible that the weld line will be cracked when the pan-head small screw is tightened.

(Problems to be Solved by the Device)

The above-described two conventional examples have faults in that the case cracks along weld lines on the periphery of a countersink, it is necessary to carry out troublesome work such as the control of tightening torque at assembling, and so forth, the size of the case increases by the dead space of the escutcheon fixing portion, and so forth.

It is an object of the present device to eliminate the dead space from the fixing portion in the fixing portion of an escutcheon and a chassis, and to prevent the periphery to a countersink from being cracked, if the countersink is used, or eliminate the troublesome tightening torque control for crack-prevention.

(Means for solving the Problems)

In the above-described background, according to this device, especially when a flat-head Phillips screw is used

to reduced the size of a case, weld lines on the periphery of a countersink can be eliminated. Specifically, a part of the periphery of the countersink is notched, and a stopper portion for suppressing the escutcheon fixing portion from expanding is provided. Hereinafter, the device will be described in detail with reference to the drawings.

(Embodiments)

Fig. 1 shows the escutcheon of the present device. Reference numeral 11 designate upper and lower fixing portions which are provided on both of the sides of an plastic escutcheon 1, are integrated with the plastic escutcheon 1, and extend backward. Countersinks 12 and notches 13 are shown. In this embodiment, the notches 13 are formed at symmetrical positions in the upper and lower fixing portions. This device is not restricted to the positions. At plastic forming, a material flows as shown by arrow a, due to the formed notches 13. The material is prevented from merging, so that no weld lines are formed. Thus, the fixing portion has no weak and brittle parts, and is kept in the uniform state. A flat-head Phillips screw (not shown in Fig. 1) is inserted through the countersink 12, and is tightened more and more. In this case, the fixing portion 11 is deformed in the direction shown by arrow b. That is, the fixing portion is deformed on the side opposite to the notch 13 and in the direction perpendicular to the

notch 13, due to the tightening force of the flat head Phillips screw. Thus, as shown in Fig. 2 of the embodiment to the present device, a stopper 15 is provided in the above-described deformation directions. Thereby, the deformation can be prevented, and moreover, the fixation of the chassis 14 and the escutcheon 1 can be more secured, due to the contact force of the stopper 15 and the fixing portion 11, and the tightening force of the screw. In Fig. 2, the stopper 15 is formed by tapping a part of the chassis 14, i.e., by tapping the chassis 14 in the direction in which the fixing portion 11 is deformed. Thus, barrier walls 16 and 17 having a thickness substantially equal to that of the fixing portion 11 are formed in the direction opposite to the notch 13 of the fixing portion 11 and in the direction perpendicular to the notch 13. Fig. 3 is a cross-sectional view taken along line AA in Fig. 2. Reference numeral 16 designates a barrier wall having a thickness substantially equal to that of the fixing portion 11 is formed by tapping a part of the chassis 14. The flat head Phillips screws are tightened, so that the upper and lower fixing portions 11 come into pressure-contact with the barrier wall 16. Thus, the distortion of the fixing portions 11 can be prevented, and the strong fixation of the escutcheon 1 and the chassis 14 can be enabled due to the screw-tightening force plus the pressure-contacting force.

Fig. 4 shows another embodiment of this device. A stopper 15' is a means formed by depressing a part of the chassis 14 in a concave shape corresponding to the fixing portions 11. The cross-section A'A' is the same as that of the above-described embodiment of Fig. 3. Reference numerals 16 and 17' designates barrier walls of the stopper 15'. The operation is similar to that described in the above embodiment.

Fig. 5 shows still another embodiment, in which rail plates 18 are mounted on the chassis 14'. The rail plates 18 can be fixed on a fixing stand (not shown) of a vehicle or the like by using rail grooves 18' as guides. Fig. 6 shows the states of the rail plates before the escutcheon is mounted. Reference numerals 19 and 20 designate parts of the rail plate 18, and function as the above-described barriers. Reference numeral 21 designates a tap hole for mounting the escutcheon which is formed in the chassis 14'. Fig. 7 is a partial cross-sectional view of a case having the rail plates 18. Reference numeral 22 designates a cover. Fig. 8 shows still another embodiment in which the tap holes 21 shown in Fig. 6 are formed in the rail plates 18" at positions thereof corresponding to the escutcheon fixing portions. Reference numerals 23 designate tap holes, and reference numeral designate 24 designates surfaces which are depressed by an amount equal to the thickness of the

escutcheon fixing portions. Reference numerals 26 and 27 designate barrier walls for preventing the distortion of the escutcheon fixing portions. Fig. 9 shows another embodiment in which the notches 29 of upper and lower escutcheon fixing portions 28 are formed in the same direction. The barrier walls 31 and 32 of a stopper 30 are formed in the direction opposite to the notches 29 and in the direction perpendicular thereto. Fig. 10 shows still another embodiment in which one escutcheon fixing portion 33 is provided on each of both of the sides in the transverse-width direction of the escutcheon. Reference numerals 34, 35, and 36 designate a countersink, a notch, and a stopper, respectively. In this case, a barrier wall 37 of the stopper 36 is formed in the direction perpendicular to the notch 35. The other barrier wall 38 is formed in the same direction as the notch 35. The position of the countersink 34 in the above-description is not particularly restricted. Moreover, the structure of the stopper 36, and the positions of the barriers are not restricted to the above-described descriptions, provided that the distortion of the escutcheon fixing portion 33, which may occurs due to the notch 35, can be prevented. In Fig. 10, reference numeral 39 designates a concavity which is formed on the escutcheon fixing portion 33 at a position on the front side of the countersink 34. A part of the stopper 38 is engaged with the concavity 39.

Thereby, the movement toward the front side of the escutcheon, which occurs due to the tightening of the screw, can be prevented.

In the above-description, mainly, the escutcheon fixing portions are formed on both of the sides in the transverse-width direction of the escutcheon. The escutcheon fixing portions may be formed on both of the sides in the longitudinal, that is, upper and lower direction of the case. The purpose, the structure, and the operation are the same as described above. Mainly, the use of the flat head Philips screws is described. This description may be applied to fixing holes for pane-head small screws.

(Advantages)

As described above, a part of a fixing hole of a fixing portion for fixing an escutcheon and a chassis, which constitute the case of a small-sized electronic device, is notched. Thereby, the fixing portion has a structure which eliminates weld lines formed at plastic-forming. The distortion can be prevented when a screw is tightened, due to the provided notch. In addition, a stopper which presents a pressure-contact force is provided. Thus, the formation of cracks can be prevented, even if a flat head Phillips screw is used, the working efficiency and the qualities can be enhanced. Thus, the present invention can be widely applied to different types of small electronic

device cases.

4. Brief Description of the Drawings

Figs. 1 to 3 show an embodiment of the present device. Figs. 4 to 10 show another embodiment. Fig. 11 shows the appearance of a general small-sized electronic device. Figs. 12 to 16 illustrate a conventional device. Fig. 12 is a partial cross-sectional view of the side surface of the device. Fig. 13 is a partial cross-sectional view of the upper surface of the device. Figs. 14 and 15 show the details thereof. Fig. 16 is a partial cross-sectional view of the upper surface of another conventional device.

Reference Numerals

11, 24, 28, 33; escutcheon fixing portion

12, 34; countersink

13, 29, 35; notch

14, 14'; chassis

15, 15', 30, 36; stopper

16, 17, 16', 17', 19, 20, 26, 27, 31, 32, 37, 38; barrier of stopper

18, 18'; rail plate

21, 23; tap hole

22; cover

Fig. 1 13. NOTCH 12. HOLE 11. ESCUTCHEON FIXING PORTION

FIG. 2 11. ESCUTCHEON FIXING PORTION 17. STOPPER BARRIER 15. STOPPER 14. CHASSIS 13. NOTCH 16. STOPPER BARRIER

FIG. 3 15. STOPPER 11. ESCUTCHEON FIXING PORTION 14. CHASSIS

Fig. 4 15'. STOPPER 17'. STOPPER BARRIER 14. CHASSIS

Fig. 5 18. RAIL PLATE

FIG. 6 20. STOPPER BARRIER 18. RAIL PLATE

FIG. 8 23. TAP HOLE